IN THE CLAIMS:

1. *(currently amended)* A method of making a low loss optical waveguiding structure disposed on a top surface of a silicon-on-insulator (SOI) wafer comprising a silicon substrate, a buried dielectric layer and a ~~relatively thin~~ silicon surface waveguiding layer disposed over the buried dielectric layer, the method comprising the steps of:

forming a ~~relatively thin~~ dielectric layer over at least a portion of the ~~relatively thin~~ silicon surface waveguiding layer;

forming a silicon waveguiding structure over at least a portion of the ~~relatively thin~~ dielectric layer, the combination of the contiguous portions of the ~~relative thin~~ silicon surface waveguiding layer, the ~~relatively thin~~ dielectric layer and the silicon waveguiding structure forming an optical waveguiding region, at least one of both the ~~relatively thin~~ silicon surface waveguiding layer and the silicon waveguiding structure defined as exhibiting at least one right-angled edge in the waveguiding region; and

rounding the at least one right-angled edge in the optical waveguiding region to reduce optical loss in the optical waveguiding structure by forming a sacrificial silicon layer over the silicon waveguiding structure and processing the sacrificial silicon layer to form rounded edges along the borders of the optical waveguiding region.

2. ***cancelled***

3. *(currently amended)* The method as defined in claim ~~2~~ 1 wherein in performing the ~~processing~~ rounding step the following step is performed:

etching the sacrificial silicon layer to form rounded sidewall fillets along the lateral borders of the optical waveguiding region.

4. *(original)* The method as defined in claim 3 wherein an isotropic etching process is used.

5. *(original)* The method as defined in claim 3 wherein an anisotropic etching process is used.

6. *(original)* The method as defined in claim 3, where a combination of an anisotropic etching process and an isotropic etching process is sued to form both top rounded edges and bottom rounded edges in the optical waveguiding region.

7. *(original)* The method as defined in claim 3 wherein plasma etching is used to form the sacrificial silicon sidewall fillets.

8. *(original)* The method as defined in claim 7 wherein the plasma etching species is selected from the group consisting of: hydrogen, fluorine chlorine, bromine and iodine.

9. *(original)* The method as defined in claim 3 wherein reactive ion etching is used to form the sacrificial silicon sidewall fillets.

10. *(currently amended)* The method as defined in claim ~~2~~ 1 wherein prior to forming the sacrificial silicon layer, an etch stop layer is formed to cover the silicon waveguiding structure and exposed surfaces of the ~~relatively thin~~ dielectric layer.

11. *(currently amended)* The method as defined in claim 10 wherein in performing the ~~processing~~ rounding step, the following step is performed:

etching the sacrificial silicon layer to form rounded sidewall fillets along the lateral borders of the optical waveguiding region.

12. *(original)* The method as defined in claim 11 where an isotropic etching process is used.

13. *(original)* The method as defined in claim 11 where an anisotropic etching process is used.

14. *(original)* The method as defined in claim 11, where a combination of an anisotropic etching process and an isotropic etching process is used to form both top rounded edges and bottom rounded edges in the optical waveguiding region.

15. *(original)* The method as defined in claim 11 wherein plasma etching is used to form the sacrificial silicon sidewall fillets.

16. *(original)* The method as defined in claim 15 wherein the plasma etching species is selected from the group consisting of: hydrogen, fluorine, chlorine, bromine and iodine.

17. *(original)* The method as defined in claim 11 wherein reactive ion etching is used to form the sacrificial silicon sidewall fillets.

18. *(original)* The method as defined in claim 11 wherein the method comprises the further steps of:

masking selected waveguiding areas where corner rounding is desired; and

etching the exposed waveguiding areas to remove the rounded sidewall fillets.

19. *(original)* The method as defined in claim 18 wherein plasma etching is used to remove the exposed, rounded sidewall fillets.

20. *(currently amended)* The method as defined in claim 1 ~~2~~ wherein in performing the ~~processing~~ rounding step, the following step is performed:

thermally oxidizing the sacrificial silicon layer to form silicon dioxide, thus forming rounded edges along the lateral extent of the optical waveguiding region.

21. *(original)* The method as defined in claim 1 wherein the method further comprises the step of hydrogen annealing the optical waveguiding structure to smooth surfaces of the silicon waveguiding structure.

22. *(currently amended)* A method of making a low loss optical waveguiding structure disposed on a top surface of a silicon-on-insulator (SOI) wafer comprising a silicon substrate, a buried dielectric layer and a silicon surface waveguiding layer disposed over the buried dielectric layer, the method comprising the steps of:

forming a dielectric layer over at least a portion of the silicon surface waveguiding layer;

forming a silicon waveguiding structure over at least a portion of the dielectric layer, the combination of the contiguous portions of the silicon surface waveguiding layer, the dielectric layer and the silicon waveguiding structure forming an optical waveguiding region, at least one of both the silicon surface waveguiding layer and the silicon waveguiding structure defined as exhibiting at least one right-angled edge in the waveguiding region; and

rounding the at least one right-angled edge in the optical waveguiding region to reduce optical loss in the optical waveguiding structure by ~~The method as defined in claim 1 wherein the rounding step comprises the step of~~ depositing the silicon waveguiding structure over a non-planar surface to create rounded edges at various locations where the surface changes height.

23. *(currently amended)* ~~The method as defined in claim 1, wherein the step of forming a silicon waveguiding structure comprises~~ A method of making a low loss optical waveguiding structure disposed on a top surface of a silicon-on-insulator (SOI) wafer comprising a silicon substrate, a buried dielectric layer and a silicon surface waveguiding layer disposed over the buried dielectric layer, the method comprising the steps of:

forming a dielectric layer over at least a portion of the silicon surface waveguiding layer;

forming a silicon waveguiding structure over at least a portion of the dielectric layer by depositing a blanket layer of silicon , the combination of the contiguous portions of the silicon surface waveguiding layer, the dielectric layer and the silicon waveguiding structure forming an optical waveguiding region, at least one of both the silicon surface

waveguiding layer and the silicon waveguiding structure defined as exhibiting at least one right-angled edge in the waveguiding region; and

rounding the at least one right-angled edge in the optical waveguiding region to reduce optical loss in the optical waveguiding structure by ~~the rounding step comprises the steps of~~: (1) depositing an oxidation-resistant layer over the ~~blanket-deposited~~ silicon ~~layer~~ waveguiding structure; (2) patterning the oxidation-resistant layer to define and protect the location of an optical waveguiding region; and (3) thermally oxidizing the exposed ~~blanket-deposited~~ silicon ~~layer~~ waveguiding structure to convert said ~~blanket-deposited layer~~ silicon waveguiding structure into silicon dioxide, the thermal oxidation resulting in lifting the oxidation-resistant layer and forming a bird's beak rounding of the underlying ~~blanket-deposited~~ silicon waveguiding structure in the pre-defined optical waveguiding region.

24. *(original)* the method as defined in claim 23, the method further comprising the step of

removing the remaining oxidation-resistant layer.

25. *(original)* The method as defined in claim 23, the method further comprising the step of

removing the converted silicon dioxide.

26. *(original)* The method as defined in claim 23 wherein silicon nitride is used as the oxidation-resistant material.

27. *(original)* The method as defined in claim 1 wherein the form of silicon used for either one or both of the silicon waveguiding structure and the sacrificial silicon layer is one or more forms of silicon chosen from the group consisting of: polysilicon, amorphous silicon, strained silicon, substantially single crystal silicon, and single crystal silicon.

28. *(original)* The method as defined in claim 27 wherein the polysilicon may comprise one or more forms of polysilicon chosen from the group consisting of grain-size-enhanced polysilicon, grain-boundary-passivated polysilicon and grain-aligned polysilicon.

29. *(original)* The method as defined in claim 1 wherein the silicon waveguiding structure comprises a single layer of silicon material.

30. *(original)* The method as defined in claim 1 wherein the silicon waveguiding structure comprises a plurality of layers of silicon material.

31. *(original)* The method as defined in claim 30 where each layer in the plurality of layers comprises the same form of silicon.

32. *(original)* The method as defined in claim 30 wherein at least two layers in the plurality of layers comprise different forms of silicon.

33. *(currently amended)* The method as defined in claim 1 wherein the rounding step is performed to round at least one right-angled edge in the ~~relatively thin~~ silicon surface waveguiding layer.

34. *(currently amended)* The method as defined in claim 33 wherein the method further comprises the steps of:

forming an oxidation-resistant material over an exposed top surface of the ~~relatively thin~~ silicon surface waveguiding layer;

performing a thermal oxidation of said ~~relatively thin~~ silicon surface waveguiding layer to convert a surface portion of said ~~relatively thin~~ silicon surface waveguiding layer into silicon dioxide, the conversion process rounding said at least one right-angled edge in the waveguiding region; and

removing the silicon dioxide and the oxidation-resistant material.

35. *(currently amended)* The method as defined in claim ~~17~~ 34 wherein the oxidation-resistant material comprises silicon nitride.

36. - 42. ***cancelled***